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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/712,387

11/12/2003

Nancy L. Swanson

95810

9606

7590

06/28/2004

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EXAMINER

LAVARIAS, ARNEL C

ART UNIT

PAPER NUMBER

2872

DATE MAILED: 06/28/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

10/712,387

Applicant(s)

SWANSON ET AL.

Examiner

Arnel C. Lavarias

Art Unit

2872

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 12 November 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1-7 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-7 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 12 November 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

## Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

## Attachment(s)

- ☐ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date 11/12/03.
- ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_.
- ☐ Notice of Informal Patent Application (PTO-152)
- ☐ Other: \_\_\_\_\_.

## **DETAILED ACTION**

### ***Drawings***

1. The drawings were received on 11/12/03. These drawings are acceptable.

### ***Claim Objections***

2. Claim 1 is objected to because of the following informalities:

Claim 1, line 4 recites the limitation 'the particles and the medium that have a refractive index'. It is unclear from the limitation whether which refractive index, i.e. the refractive index of the particles, the refractive index of the medium, or the refractive indices of both the particles and the medium, is being selected to maximize/minimize the scattering or absorption properties.

Appropriate correction is required.

### ***Claim Rejections - 35 USC § 102***

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

4. Claim 1, as best understood, is rejected under 35 U.S.C. 102(b) as being anticipated by Swanson et al. (N. L. Swanson, D. B. Billard, 'Multiple scattering efficiency and optical extinction', Phys. Rev. E, vol. 61, no. 4, April 2000, pp. 4518-4522.), of record.

Swanson et al. discloses a method for selectively controlling scattering and absorption of electromagnetic waves that are incident upon a material that contains particles suspended in a medium (See entire document, particularly Sections II-V; Figures 5, 7-9), the method comprising the steps of selecting the particles and the medium that have a refractive index that either maximizes or minimized, scattering or absorption of electromagnetic waves of a specified wavelength or within a specified range of wavelengths.

5. Claim 1, as best understood, is rejected under 35 U.S.C. 102(b) as being anticipated by Wood (U.S. patent No. 4716123).

Wood discloses a method for selectively controlling scattering and absorption of electromagnetic waves that are incident upon a material that contains particles suspended in a medium (See entire document, particularly Abstract; Figures 3-5; col. 5, line 3-col. 8, line 27), the method comprising the steps of selecting the particles and the medium that have a refractive index that either maximizes or minimized, scattering or absorption of electromagnetic waves of a specified wavelength or within a specified range of wavelengths.

### ***Claim Rejections - 35 USC § 103***

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. Claims 2, 4 are rejected under 35 U.S.C. 103(a) as being unpatentable over Swanson et al.

Swanson et al. discloses a method for maximizing scattering of electromagnetic waves incident upon a material containing particles suspended in a medium (See entire document, particularly Sections II-V; Figures 5, 7-9), the method comprising the steps of identifying possible combinations of particles and mediums; calculating a scattering extinction for each combination based on a refractive index ratio and particle size of each combination, at a specified wavelength; and dividing the scattering extinction by the associated particle size to arrive at a value for each combination, wherein the combination with the highest value is the combination that will maximize scattering and/or absorption of the electromagnetic waves. Swanson et al. additionally discloses the particles being spherical in shape (See Section III). Swanson et al. lacks the method minimizing scattering, wherein the combination with the smallest value will minimize the scattering of the electromagnetic waves. However, one skilled in the art would have determined that, if the global maximum of the  $\frac{\tau}{\tau_o}$  versus  $x$  curve (See Figure 9; Section 5) for each refractive index ratio yields the maximum efficiency of the material in terms of scattering and absorption, then the global minima of the  $\frac{\tau}{\tau_o}$  versus  $x$  curve for each refractive index ratio would similarly yield the minimum efficiency of the material in terms of scattering and absorption. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have the method also

minimize scattering, wherein the combination with the smallest value will minimize the scattering of the electromagnetic waves, for the purpose of optimizing particle size and material medium properties for applications that require minimum scattering of the incident light.

8. Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Swanson et al.

Swanson et al. discloses the invention as set forth above in Claim 2, except for the backscattering of the electromagnetic waves being minimized. The Examiner notes that backscattering of electromagnetic waves is a specific condition of general scattering of electromagnetic waves from a medium in that backscattered light is light that is scattered back toward the source of electromagnetic waves, and that the general scattering strength of a particle in a medium is given by the light scattering extinction  $Q$  (See Page 4518, column 2). It would have been obvious to one having ordinary skill in the art at the time the invention was made to minimize the backscattering of the electromagnetic waves, since it has been held that discovering an optimum value of a result effect variable (in the instant case,  $Q_{\text{ext}}$  or extinction), involves only routine skill in the art. One would have been motivated to minimize the backscattering of the electromagnetic waves for the purpose of decreasing (such as in applications of radar stealth applications) the intensity of the electromagnetic waves that are backscattered from the scattering medium, thus making detection of the particle in the medium difficult. *In re Antonie*, 559 F.2d 618, 195 USPQ 6 (CCPA 1977). *In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPA 1980).

9. Claims 5-7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Swanson et al.

Swanson et al. discloses the invention as set forth above in Claim 2, except for the absorption of the electromagnetic waves being minimized. However, one skilled in the art would have determined that, if the global maximum of the  $\frac{\tau}{\tau_o}$  versus  $x$  curve (See Figure 9; Section 5) for each refractive index ratio yields the maximum efficiency of the material in terms of scattering and absorption, then the global minima of the  $\frac{\tau}{\tau_o}$  versus  $x$  curve for each refractive index ratio would similarly yield the minimum efficiency of the material in terms of scattering and absorption. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have the method also minimize absorption, wherein the combination with the smallest value will minimize the absorption of the electromagnetic waves, for the purpose of optimizing particle size and material medium properties for applications that require minimum absorption of the incident light.

### *Conclusion*

10. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

R. Graaff et al., 'Reduced light-scattering properties for mixtures of spherical particles: a simple approximation derived from Mie calculations', Appl. Opt., vol. 31, no. 10, 4/1/1992, pp. 1370-1376.

Graaff et al. is being cited to evidence theoretical and experimental studies regarding scattering of light in a medium comprising scattering/absorbing particles. In particular,

Graaff et al. discusses the function of particle size and relative refractive index (i.e. the ratio of the refractive index of the particle to the refractive index of the surrounding medium) to incident light that undergoes Mie scattering processes. Graaff et al. lacks any details regarding the maximization or minimization of scattering, backscattering, or absorption of the incident light that undergoes this Mie scattering process, particularly by prior determination by the step of dividing the scattering extinction by the associated particle size to arrive at a value for the particle/medium combination, the size of this values determining the maximization or minimization of scattering, backscattering, or absorption.

11. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Arnel C. Lavarias whose telephone number is 571-272-2315. The examiner can normally be reached on M-F 8:30 AM - 5 PM EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Drew Dunn can be reached on 571-272-2312. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

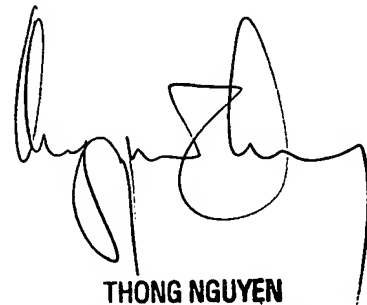


Art Unit: 2872

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Arnel C. Lavarias  
6/22/04



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